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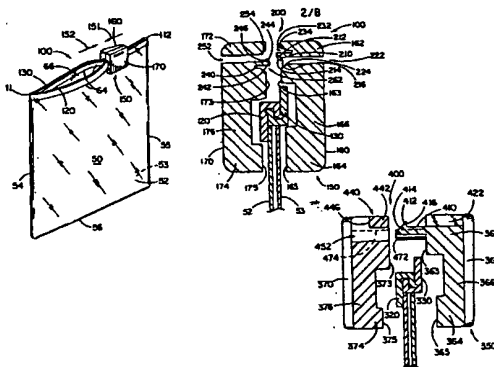
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- (71) Applicant (for all designated States except US): THE GLAD PRODUCTS COMPANY [US/US]; 1221 Broadway, Oakland, CA 94612 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): SAVICKI, Alan, F., Sr. [US/US]; 577 Beaconsfield Avenue, Naperville, IL 60565 (US).
- (74) Agents: AUGUSTYN, John, M. et al.; Leydig, Voit & Mayer, Ltd., Suite 4900, Two Prudential Plaza, 180 North Stetson, Chicago, IL 60601-6780 (US).
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(54) Title: CLOSURE DEVICE



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(57) Abstract: A multi-piece slider member (150) is provided for use with a closure device having interlocking fastening strips (120, 130) disposed along opposing side walls of a storage container, such as a conventional plastic bag. The slider member (150) includes a first housing segment (160), a separate second housing segment (170), and a latching mechanism (200) for use in assembling the first and second housing segments together onto the fastening strips. The latching mechanism (200) includes a first member (210) disposed on the first housing segment and a cooperating second member (240) disposed on the second housing segment. When the first and second housing segments (150, 160) are moved together during assembly, the second member (240) receives the first member (210) while the first member engages the second member to hold the first and second housing segments together in an assembled portion. The slider member (150) also includes an alignment mechanism (270) for aligning the first and second housing segments. The alignment mechanism (270) includes a first pin (272) in the first housing segment and a first cooperating slot (274) in the second housing segment. The first pin (272) engages the first slot (274) when the housing segments are assembled.

CLOSURE DEVICE

FIELD OF THE INVENTION

The present invention relates generally to closure
5 devices and, more particularly, to a closure device
having interlocking fastening strips, a slider member
comprised of separate first and second housing segments,
and a latching mechanism for use in assembling the first
and second housing segments together onto the
10 interlocking fastening strips. The inventive closure
device may be employed in traditional fastener areas and
is particularly well suited for fastening flexible
storage containers, such as plastic bags.

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BACKGROUND OF THE INVENTION

The use of closure devices for fastening storage
containers, including plastic bags, is generally well
known. Furthermore, the manufacture of closure devices
20 made of plastic materials is generally well known to those
skilled in the art, as demonstrated by the numerous
patents in this area.

A particularly well-known use for closure devices is
25 in connection with flexible storage containers, such as
plastic bags. Such closure devices provide a convenient
way to close the bag in order to retain matter therein.

Conventional closure devices typically utilize mating
30 fastening strips or closure elements which are used to
selectively seal the bag. With such closure devices,
however, it is often difficult to determine whether the
fastening strips are fully occluded. This problem is
particularly acute when the fastening strips are

relatively narrow. Accordingly, when such fastening strips are employed, there exists a reasonable likelihood that the closure device is at least partially open.

5 Such fastening strips are particularly difficult to manipulate or handle by individuals with limited manual dexterity. Thus, in order to assist these individuals and for ease of use by individuals with normal dexterity, the prior art has provided sliders for use in opening and
10 closing the fastening strips, as disclosed, for example, in U.S. Patent Nos. 4,199,845, 5,007,142, 5,007,143, 5,010,627, 5,020,194, 5,070,583, 5,283,932, 5,301,394, 5,426,830, 5,431,760, 5,442,838, and 5,448,808. Some of these sliders include a separator finger which extends at
15 least partially between the fastening strips. When the slider is moved in the appropriate direction, the separator finger divides the fastening strips and opens and the bag.

20 While the use of a slider certainly facilitates the opening and closing of fastening strips, there are certain difficulties involved with installing and assembling the slider onto the fastening strips and with retaining the slider thereon. In an attempt to rectify some of these
25 difficulties, the prior art has provided a variety of slider designs including various multi-piece sliders, as disclosed, for example, in U.S. Patent Nos. 5,007,142, 5,283,932, and 5,426,830. These multi-piece sliders suffer from deficiencies including, for example, a relatively
30 complex construction, a high relative cost, and a relatively difficult installation upon and assembly onto the fastening strips.

OBJECTS OF THE INVENTION

Accordingly, a general object of the present invention is to provide a slider member for closure devices which overcomes the deficiencies of the prior art.

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A more specific object of the present invention is to provide a multi-piece slider member for closure devices which is easily installed upon and assembled onto interlocking fastening strips.

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A further object of the present invention is to provide a multi-piece slider member for closure devices which is formed of separate housing segments and includes a latching mechanism for use in assembling these housing segments together upon interlocking fastening strips.

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Another object of the present invention is to provide a multi-piece slider member as characterized above which is convenient to use.

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An additional object of the present invention is to provide a multi-piece slider member of the foregoing type which is relatively simple and economical in construction, and which lends itself to reliable operation and use.

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SUMMARY OF THE INVENTION

Accordingly, a multi-piece slider member is provided for use with a closure device having interlocking fastening strips disposed along opposing side walls of a storage container, such as a conventional plastic bag. The slider member comprises a first housing segment, a

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separate second housing segment, and a latching mechanism for use in assembling the first and second housing segments together onto the fastening strips. The latching mechanism includes a first member disposed on
5 the first housing segment and a cooperating second member disposed on the second housing segment. The first and second members of the latching mechanism each have a shoulder with an edge portion. When the first and second housing segments are moved together during assembly, the
10 second member of the latching mechanism receives the first member of the latching mechanism while the edge portion of the first member engages the edge portion of the second member to hold the first and second housing segments together in an assembled position.

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These and other objects, features, and advantages of the present invention will become more readily apparent upon reading the following detailed description of the illustrated embodiments and upon reference to the
20 accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a storage container in the form of a plastic bag utilizing a closure device
25 comprised of interlocking fastening strips and a slider member constructed in accordance with the present invention;

FIG. 2 is an enlarged, partially fragmentary, top
30 plan view of the closure device depicted in FIG. 1, showing the two housing segments of the slider member in an assembled position upon the interlocking fastening strips and a first embodiment of a latching mechanism for

use in assembling the two housing segments together;

FIG. 3 is a rear end view as seen in the direction of line 3-3 of FIG. 2, but showing the interlocking fastening strips removed for clarity and the two housing segments of the slider member in an unassembled position;

FIG. 4 is an enlarged cross-sectional view taken along line 4-4 of FIG. 2, but showing the two housing segments of the slider member in the unassembled position;

FIG. 5 is an enlarged cross-sectional view taken along line 5-5 of FIG. 2, but showing the two housing segments of the slider member in the unassembled position and showing an alignment mechanism for use in aligning the two housing segments during their assembly;

FIG. 6 is an enlarged cross-sectional view taken along line 6-6 of FIG. 2;

FIG. 7 is an enlarged cross-sectional view taken along line 7-7 of FIG. 2;

FIG. 8 is a side elevational view as seen in the direction of line 8-8 of FIG. 2, but showing the interlocking fastening strips removed for clarity;

FIG. 9 is a side elevational view as seen in the direction of line 9-9 of FIG. 2, but showing the interlocking fastening strips removed for clarity;

FIG. 10 is a rear end view as seen in the direction of line 10-10 of FIG. 2;

FIG. 11 is a partially fragmentary, top plan view of
5 another embodiment showing the two housing segments of the slider member in an assembled position upon the interlocking fastening strips and showing a second embodiment of the latching mechanism;

10 FIG. 12 is a rear end view as seen in the direction of line 12-12 of FIG. 11, but showing the interlocking fastening strips removed for clarity and the two housing segments of the slider member in an unassembled position;

15 FIG. 13 is a cross-sectional view taken along line 13-13 of FIG. 11, but showing the two housing segments of the slider member in the unassembled position to better depict the second embodiment of the latching mechanism;

20 FIG. 14 is a cross-sectional view taken along line 14-14 of FIG. 11, but showing the two housing segments of the slider member in the unassembled position and showing an alignment mechanism for use in aligning the two housing segments during their assembly;

25 FIG. 15 is a cross-sectional view taken along line 15-15 of FIG. 11;

FIG. 16 is a cross-sectional view taken along line
30 16-16 of FIG. 11;

FIG. 17 is a cross-sectional view taken along line

17-17 in FIG. 2, but showing a second embodiment of the interlocking fastening strips;

FIG. 18 is a cross-sectional view taken along line
5 18-18 in FIG. 2, but showing a third embodiment of the interlocking fastening strips;

FIG. 19 is a cross-sectional view taken along line
19-19 in FIG. 2, but showing a fourth embodiment of the
10 interlocking fastening strips; and

FIG. 20 is a cross-sectional view taken along line
20-20 in FIG. 2, but showing a fifth embodiment of the interlocking fastening strips.

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While the present invention is susceptible to various modifications and alternative constructions, certain illustrated embodiments thereof have been shown in the drawings and will be described in detail below.
20 It should be understood, however, that there is no intention to limit the present invention to the disclosed structural forms. On the contrary, the intention is to cover all modifications, alternative constructions, and equivalents that fall within the spirit and scope of the
25 present invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Turning now to the drawings, a closure device constructed in accordance with the present invention is
30 generally designated by reference numeral 100. As best shown in FIG. 1, the closure device 100 is intended for use with a storage container 50, such as a conventional

plastic bag, which includes a pair of complementary sheets or opposing flexible side walls 52, 53 attached at lateral sides 54, 55 and bottom 56 to form a storage compartment. The side walls 52, 53 are also unattached at upper edge portions 64 to form a mouth 66 for the storage container 50. Although a rectangularly-shaped storage container or bag 50 is specifically illustrated herein, it will be readily appreciated by those skilled in the art that other configurations may alternatively be employed without departing from the scope or spirit of the present invention.

As shown in FIG. 1, the closure device 100 includes a pair of interlocking fastening strips 120, 130 which are disposed along the upper edge portions 64 of the opposing side walls 52, 53. The closure device 100 also includes a slider member 150 which is slidably carried by the two fastening strips 120, 130. More specifically, the first fastening strip 120 is attached to the upper edge portion 64 of the side walls 52, the second fastening strip 130 is attached to the upper edge portion 64 of the other side wall 53, and the inventive slider member 150 slidably straddles the first and second fastening strips 120 and 130.

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As will be described in greater detail below, the interlocking fastening strips 120, 130 may be of virtually any type, kind, version, or form including, for example: (1) shear action or Z-axis fastening strips as shown herein at FIGS. 4-7, 10, and 13-16; (2) U-channel fastening strips as shown herein at FIG. 17; (3) arrowhead-type fastening strips, as disclosed in U.S. Patent Nos. 3,198,228 (which reissued as Re. 28,969), 4,736,496, and 5,363,540 and as shown herein at FIG. 18;

(4) rolling action fastening strips, as disclosed in U.S. Patent No. 5,007,143 and as shown herein at FIG. 19; and/or (5) profile fastening strips, as disclosed in U.S. Patent No. 5,664,299 and as shown herein at FIG. 20.

5 While the interlocking fastening strips 120, 130 depicted in FIGS. 4-7, 10, and 13-16 are of the shear action or Z-axis variety, it will be readily appreciated by those skilled in the art that these fastening strips were selected for illustrative purpose only and that any other

10 variety of interlocking fastening strips may alternatively be used, including those shown in FIGS. 17-20, without departing from the scope of spirit of the present invention. In addition, all of the above-identified patents and applications are hereby incorporated by

15 reference in their entireties.

In operation, the slider member 150 facilitates the occlusion and deocclusion of the interlocking fastening strips 120, 130 when moved in the appropriate direction

20 along the fastening strips. In particular, the slider member 150 facilitates the occlusion of the fastening strips 120, 130 when moved towards a first end 111 thereof, and facilitates the deocclusion of the fastening strips when moved towards a second end 112 thereof. In

25 other words, when the slider 150 is moved in an occlusion direction, as indicated by reference numeral 151 in FIGS. 1, 2, and 11, it facilitates the closure of the fastening strips, and when the slider 150 is moved in a deocclusion direction, as indicated by reference numeral 152, it

30 facilitates the separation of the fastening strips. The first and second ends 111 and 112 of the interlocking fastening strips correspond to, and are aligned with, the two lateral sides 54, 55 of the complementary sheets or

opposing side walls 52.

The slider member 150 of the present invention comprises separate first and second housing segments 160 and 170 which have substantially complementary configurations and are formed from separate pieces of suitable plastic material. The first housing segment 160 includes a top portion 162 with a face 163, a bottom portion 164 with a shoulder 165, and an intermediate side portion 166 arranged between the top and bottom portions 162 and 164. Likewise, the second housing segment 170 includes a top portion 172 with a face 173, a bottom portion 174 with a shoulder 175, and an intermediate side portion 176 arranged between the top and bottom portions 172 and 174.

As will be readily appreciated by those skilled in the art, the slider member 150 may be provided with a separator finger or other structure which extends downwardly from one or both of the top portions 162 and 172 of the first and second housing segments 160 and 170, as shown, for example, in FIGS. 18 and 19, and into an internal void between the side portions 166 and 176 of the two housing segments 160 and 170. In use, this separator finger provides for the separation of the interlocking fastening strips when the slider member is moved in the deocclusion direction, as disclosed, for example, in U.S. Patent Nos. 5,007,142, 5,007,143, 5,010,627, 5,020,194, 5,067,208, 5,070,583, 5,088,971, 5,131,121, 5,161,286, 5,189,764, 5,282,932, 5,301,395, 5,426,830, 5,448,808, and 5,442,837.

In accordance with an important aspect of the present invention, the two housing segments of the slider member

are also provided with a latching mechanism which facilitates their installation upon and assembly onto the interlocking fastening strips of the closure device. As will be described in greater detail below, two embodiments
5 of the inventive latching mechanism are illustrated herein at FIGS. 2-10 and 11-16, respectively. Each embodiment of the latching mechanism will now be addressed in turn.

As shown in FIGS. 2-10, the first embodiment of the
10 inventive latching mechanism 200 comprises a first member 210 disposed on the first housing segment 160 and a cooperating second member 240 disposed on the second housing segment 170. More specifically, the first member 210 of the latching mechanism 200 has a generally planar
15 configuration and projects outwardly from the face 163 of the first housing segment 160. The second member 240 of the latching mechanism 200 has a generally planar configuration and projects outwardly from the face 173 of the second housing segment 170. The first member 210 of
20 the latching mechanism 200 is also substantially parallel to, but slightly offset from, the second member 240 of the latching mechanism 200. On account of this construction, the second member 240 of the latching mechanism 200 is positioned to receive and engage the first member 210 of
25 the latching mechanism 200 in a partially overlapping manner when the first and second housing segments 160 and 170 are moved together, as depicted, for example, in FIGS. 4 and 6.

30 Although other constructions are permissible and would certainly fall within the scope and spirit of the present invention, those skilled in the art will readily appreciate that forming the first member 210 of the latching mechanism 200 and the first housing segment 160

of the slider member 150 of unitary construction provides many advantages. Those skilled in the art will also appreciate that forming the second member 240 of the latching mechanism 200 and the second housing segment 170 of the slider member 150 of unitary construction provides similar advantages.

In order to provide a desired resiliency to the first member 210 of the latching mechanism 200 and a suitable receiving gap for the second member 240 of the latching mechanism 200 when the first and second housing segments 160 and 170 are assembled together, a pair of apertures 222 and 232 are formed on opposite sides of the first member 210. As best shown in FIG. 4, the first aperture 222 extends completely through the top portion 162 of the first housing segment 160 and the second aperture 232 extends only partially through the top portion 162 of the first housing segment 160. In this way, the first and second apertures 222 and 232 are each adjacent to the first member 210, but project inwardly from the face 163 of the top portion 162 to different depths. Each aperture 222 and 232 also includes a chamfer 224 and 234 at the face 163 of the top portion 162.

The second member 240 of the latching mechanism 200 also includes a pair of apertures 252 and 262 formed on opposite sides thereof which provides a desired resiliency to the second member 240 and a receiving gap for the first member 210 when the first and second housing segments 160 and 170 are assembled together. More specifically, the first aperture 252 is adjacent to the second member 240 and extends completely through the top portion 172 of the second housing segment 170. The second aperture 262 is adjacent to the second member 240, but extends only

partially through the top portion 172 of the second housing segment 170. Each aperture 252 and 262 also projects inwardly from the face 173 of the top portion 172 and includes a chamfer 254 and 264.

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While the four apertures 222, 232, 252, and 262 of the latching mechanism 200 are shown extending to given depths, it will be readily appreciated by those skilled in the art that these apertures 222, 232, 252, and 262 may, of course, extend to virtually any depth and be of virtually any number, provided that there is sufficient room for the first and second members 210 and 240 when the first and second housing segments 160 and 170 are assembled together. In alternative embodiments, for example, the first apertures 222 and 252 of the latching mechanism 200 may extend only partially through the top portions 162 and 172 of the first and second housing segments 160 and 170, respectively, without departing from the scope or spirit of the present invention. Aside from the depth of these apertures 222, 232, 252, and 262, the relative thickness and the material properties of the first and second members 210 and 240 are also factors which influence and/or contribute to the resiliency of the first and second members 210 and 240.

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As best shown in FIGS. 4 and 6, the first and second members 210 and 240 of the inventive latching mechanism 200 each include a shoulder 212 and 242 at their respective distal ends which, as described in greater detail below, cooperate to retain the first and second housing segments 160 and 170 together. In the illustrated embodiment, the shoulders 212 and 242 of the first and second members 210 and 240 each have a generally right-triangular configuration. In particular, the shoulder 212

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of the first member 210 includes an inclined camming surface 214 which advances toward the chamfer 224 of aperture 222 in an outwardly sloping manner and an edge portion 216 which transitions back toward the longitudinal axis of the first member 210 in a substantially perpendicular manner. Similarly, the shoulder 242 of the second member 240 includes an inclined camming surface 244 which advances toward the chamfer 254 of aperture 252 in an outwardly sloping manner and an edge portion 246 which transitions back toward the longitudinal axis of the second member 240 in a substantially perpendicular manner. In this way, the shoulder 212 of the first member 210 projects away from the chamfer 234 of aperture 232 while the shoulder 242 of the second member 240 projects away from the chamfer 264 of aperture 262. In addition, when the first and second housing segments 160 and 170 are positioned for prospective assembly, as shown, for example, in FIG. 4, the shoulder 212 of the first member 210 projects at least partially toward the shoulder 242 of the second member 240.

In order to facilitate proper alignment between the first and second housing segments 160 and 170 during their assembly upon the interlocking fastening strips 120, 130, a convenient alignment mechanism 270 is also provided on the first and second housing segments 160 and 170. In the illustrated embodiment, the alignment mechanism 270 comprises a pair of spaced-apart alignment pins 272 projecting outwardly from the top portion 162 of the first housing segment 160 and a pair of cooperating slots 274 formed in the top portion 172 of the second housing segment 170. More specifically, the pins 272 of the alignment mechanism 270 project outwardly from the face 163 of top portion 162 and are disposed on opposite sides

of the first member 210. The slots 274 of the alignment mechanism 270 project inwardly from the face 173 of top portion 172 and are disposed on opposite sides of the second member 240. The slots 274 of the alignment mechanism 270 are also substantially aligned with the pins 272 of the alignment mechanism 270. Thus, when the first and second housing segments 160 and 170 are moved together during assembly, the slots 274 of the alignment mechanism 270 receive the pins 272 of the alignment mechanism 270 to provide proper alignment between the first and second housing segments 160 and 170. The alignment mechanism 270 also protects against the inadvertent detachment or separation of the first and second housing segments 160 and 170 when opposed lateral shearing forces are applied to the first and second housing segments 160 and 170 in directions substantially equivalent to the occlusion and deocclusion directions 151 and 152.

While the pins 272 of the alignment mechanism 270 are shown projecting from the top portion 162 of the first housing segment 160 and the slots 274 of the alignment mechanism 270 are shown extending into the top portion 172 of the second housing segment 170, it will be readily appreciated by those skilled in the art that the relative location of the pins 272 and slots 274 may be reversed so that the pins 272 project from the top portion 172 of the second housing segment 170 and the slots 274 extend into the top portion 162 of the first housing segment 160. In addition, the alignment mechanism 270 may be provided with virtually any number of pins 272 and slots 274 without departing from the scope or spirit of the present invention.

During assembly, the first and second housing segments 160 and 170 are initially moved into an unassembled position, as shown in FIGS. 3, 4, and 5. In the unassembled position, the first housing segment 160 is spaced-apart from, but substantially aligned with, the second housing segment 170. Next, the alignment pins 272 of the alignment mechanism 270 are moved into engagement with the slots 274 of the alignment mechanism 270. Opposing forces are then applied to the first and second housing segments 160 and 170 to move these two housing segments into an assembled position, as shown in FIGS. 2, 6, and 7. As the first and second housing segments 160 and 170 are moved toward the assembled position, the alignment mechanism 270 keeps the first and second housing segments 160 and 170 in proper alignment while the inclined camming surface 214 of the first member 210 engages the inclined camming surface 244 of the second member 240 which causes the first and second members 210 and 240 to flex slightly apart. Once the first and second housing segments 160 and 170 arrive at the assembled position, the first and second members 210 and 240 of the latching mechanism 200 flex back to the position shown in FIG. 6 while the edge portion 216 of the first member 210 engages the edge portion 246 of the second member 240 to provide a convenient snap-fit interface between the first and second housing segments 160 and 170.

In the assembled position as shown in FIG. 6, the face 163 of the first housing segment 160 is held firmly against the face 173 of the second housing segment 170 by this engagement between the edge portion 216 of the first member 210 and the edge portion 246 of the second member 240. In addition, the shoulder 212 of the first member 210 is received by the first aperture 252 formed in the

top portion 172 of the second housing segment 170 while the shoulder 242 of the second member 240 is received by the first aperture 222 formed in the top portion 162 of the first housing segment 160. The shoulders 212 and 242
5 of the first and second members 210 and 240 are also proximate to chamfers 254 and 224, respectively.

A second embodiment of the inventive latching
10 mechanism 400 is shown in FIGS. 11-16. In this embodiment, the latching mechanism 400 comprises a first member 410 projecting from the first housing segment 360 and a cooperating second member 440 disposed on the second housing segment 370. More specifically, the first member
15 410 of the latching mechanism 400 has a generally planar configuration and projects outwardly from the face 363 of the first housing segment 360. The second member 440 of the latching mechanism 400 forms a part of the second housing segment 370 and projects inwardly from the face
20 373 thereof. The first member 410 of the latching mechanism is also substantially parallel to, but offset from, the second member 440 of the latching mechanism. On account of this construction, the second member 440 of the latching mechanism is positioned to receive and engage the
25 first member 410 of the latching mechanism in a partially overlapping manner when the first and second housing segments 360 and 370 are moved together, as depicted, for example, in FIGS. 13 and 15.

30 While other constructions are certainly permissible, those skilled in the art will readily appreciate that forming the first member 410 of the latching mechanism 400 and the first housing segment 360 of the slider member 350 of unitary construction provides clear

advantages. Likewise, those skilled in the art will also appreciate that forming the second member 440 of the latching mechanism 400 and the second housing segment 370 of the slider member 350 of unitary construction provides
5 similar advantages.

In order to provide a suitable receiving gap for the first member 410 of the latching mechanism 400 when the first and second housing segments 360 and 370 are
10 assembled together, a single aperture 452 is formed within the top portion 372 of the second housing segment 370. A single aperture 422 is also formed within the top portion 362 of the first housing segment 360. As best shown in FIG. 13, aperture 422 is substantially straight and
15 extends completely through the top portion 362 of the first housing segment 360. The aperture 452 is generally L-shaped and extends completely through the top portion 372 of the second housing segment 370. In addition, aperture 422 is adjacent to the first member 410 and
20 projects inwardly from the face 363 of top portion 362. The aperture 452 is adjacent to the second member 440 and projects inwardly from the face 373 of top portion 372. In this embodiment, the second member 440 is substantially more rigid than the first member 410. Also, the
25 resiliency of the first member 410 is determined primarily by the relative thickness and the material properties thereof.

While the two apertures 422 and 452 of the first and
30 second members 410 and 440 are shown extending completely through the top portions 362 and 372 of the first and second housing segments 360 and 370, it will be readily appreciated by those skilled in the art that these apertures 422 and 452 may extend to virtually any depth

and be of virtually any number, provided that there is sufficient room for the first member 410 when the first and second housing segments 360 and 370 are assembled together. In alternative embodiments, for example,
5 aperture 452 may extend only partially through the top portion 372 of the second housing segment 370 without departing from the scope or spirit of the present invention.

10 As best shown in FIGS. 13 and 15, the first member 410 of the latching mechanism 400 includes a shoulder 412 at its distal end. The second member 440 of the latching mechanism 400 includes a shoulder 442 which is disposed adjacent to aperture 452. As will be described more fully
15 below, the shoulder 412 of the first member 410 cooperates with the shoulder 442 of the second member 440 to retain the first and second housing segments 360 and 370 together. In the illustrated embodiment, the shoulder 412 of the first member 410 has a generally right-triangular
20 configuration. More specifically, this shoulder 412 includes an inclined camming surface 414 which advances toward the top portion 362 of the second housing segment 360 in an outwardly sloping manner. In addition, the shoulder 412 includes an edge portion 416 which
25 transitions back toward the longitudinal axis of the first member 410 in a substantially perpendicular manner. The shoulder 442 of the second member 440 includes an edge portion 446 which extends vertically downwardly from the top surface of the second housing segment 370 into
30 aperture 452.

In order to facilitate proper alignment between the first and second housing segments 360 and 370 during their assembly upon the interlocking fastening strips 320, 330,

an alignment mechanism 470 is also provided on the first and second housing segments 360 and 370. In the illustrated embodiment, the alignment mechanism 470 comprises a pair of spaced-apart alignment pins 472 projecting outwardly from the top portion 362 of the first housing segment 360 and a pair of cooperating slots 474 formed through the top portion 372 of the second housing segment 370. More specifically, the pins 472 of the alignment mechanism 470 project outwardly from the face 363 of top portion 362 and are disposed on opposite sides of the first member 410. The slots 474 of the alignment mechanism 470 project inwardly from the face 373 of top portion 372 and are disposed on opposite sides of the second member 440. The slots 474 of the alignment mechanism 470 are substantially aligned with the pins 472 of the alignment mechanism 470. Thus, when the first and second housing segments 360 and 370 are moved together during assembly, the slots 474 of the alignment mechanism 470 receive the pins 472 of the alignment mechanism 470 to provide proper alignment between the first and second housing segments. The alignment mechanism 470 also protects against the inadvertent detachment or separation of the first and second housing segments 360 and 370 when opposed lateral shearing forces are applied to the first and second housing segments 360 and 370 in directions substantially equivalent to the occlusion and deocclusion directions 351 and 352.

While the pins 472 of the alignment mechanism 470 are shown projecting from the top portion 362 of the first housing segment 360 and the slots 474 of the alignment mechanism 470 are shown extending through the top portion 372 of the second housing segment 370, it will be readily appreciated by those skilled in the art that the relative

location of the pins 472 and slots 474 may be reversed so that the pins 472 project from the top portion 372 of the second housing segment and the slots 474 extend into the top portion 362 of the first housing segment. In
5 addition, the alignment mechanism 470 may be provided with virtually any number of pins 472 and slots 474 without departing from the scope or spirit of the present invention.

10 During assembly, the first and second housing segments 360 and 370 are initially moved into an unassembled position, as shown in FIGS. 12-14. In the unassembled position, the first housing segment 360 is spaced-apart from, but substantially aligned with, the
15 second housing segment 370. Next, the alignment pins 472 of the alignment mechanism 470 are moved into engagement with the slots 474 of the alignment mechanism. Opposing forces are then applied to the first and second housing segments 360 and 370 to move these two housing segments
20 into an assembled position, as shown in FIGS. 11, 15, and 16. As the first and second housing segments 360 and 370 are moved toward the assembled position, the alignment mechanism 470 keeps the first and second housing segments 360 and 370 in proper alignment. The inclined camming
25 surface 414 of the first member 410 engages the shoulder 442 of the second member 440 which causes the shoulder 412 of the first member 410 to flex downwardly into aperture 452.

30 Once the first and second housing segments 360 and 370 arrive at the assembled position, the first member 410 of the latching mechanism 400 flexes back to the position shown in FIG. 15. The edge portion 416 of the first member 410 engages the edge portion 446 of the second

member 440 to provide a convenient snap-fit interface between the first and second housing segments 360 and 370. In the assembled position, the face 362 of the first housing segment 360 is held firmly against the face 372 of the second housing segment 370 by this engagement between the edge portion 416 of the first member 410 and the edge portion 446 of the second member 440. Also, the first member 410 is fully received by aperture 452 and abuts the shoulder 442 of the second member 440, as shown in FIG. 15.

While two embodiments of the inventive latching mechanism have been specifically described and illustrated herein, it will be appreciated by those skilled in the art that these particular embodiments have been provided for illustrative purposes only and do not represent an exhaustive register of each and every latching mechanism covered by the present invention. Indeed, other types, kinds, versions, and forms of the latching mechanism may alternatively be employed without departing from the scope or spirit of the present invention.

As mentioned briefly above, the interlocking fastening strips of the closure device may also be of virtually any type, kind, version, or form. By way of example, the fastening strips 120, 130, 320, 330 may comprise shear action or Z-axis fastening strips, as shown herein at FIGS. 4-7, 10, and 13-16. As shown in FIG. 16, shear action closure strips include a first web 324 and a complementary second web 334 which occlude upon moving the slider member 350 in the occlusion direction 351.

The interlocking fastening strips may comprise U-channel fastening strips, as shown in FIG. 17. U-channel

fastening strips 520, 530 include a female element 521 which interlockingly receives a male element 531. As shown in FIG. 17, the male element 531 includes a pair of inner hook portions 532 and a pair of outer wings 533.

5 The female element 521 includes a pair of hook portions 522 which are adapted to interlockingly engage the hook portions 532 of the male element 531.

In addition, the interlocking fastening strips may

10 comprise arrowhead-type fastening strips, as shown in FIG. 18. As described more fully in U.S. Patent Nos. 3,198,228 (which reissued as Re. 28,969), 4,736,496, and 5,363,540, arrowhead-type fastening strips 620, 630 include an outer female web 626 with a C-shaped engagement portion 627 and

15 an inner male web 636 with an arrowhead-shaped engagement portion 637. In use, the inner male web 636 and the outer female web 626 are selectively occluded and deoccluded by moving the slider member 650 in the appropriate direction. The deocclusion action is facilitated by a separator

20 finger 654 which projects downwardly between the inner male web 636 and the outer female web 626.

The interlocking fastening strips may comprise rolling action fastening strips, as shown, for example, in

25 FIG. 19. Rolling action fastening strips 720, 730 include profile elements 738 and 728. In another embodiment, a separator finger 754 may be used to deocclude the fastening strips.

30 The interlocking fastening strips may comprise profile fastening strips, as shown in FIG. 20. As described more fully in U.S. Patent No. 5,664,299, profile fastening strips 820, 830 include a first profile 829 having uppermost and bottommost closure elements 841 and

842, respectively, and a second profile 839 having corresponding uppermost and bottommost closure elements 843 and 844, respectively. In use, the uppermost and bottommost closure elements of the first and second
5 profiles 829 and 839 are selectively occluded and deoccluded by moving the slider member 850 in the appropriate direction.

It will be readily appreciated by those skilled in
10 the art that the embodiments of the inventive latching mechanism may be employed with these and other types of fastening strips, including those shown in FIGS. 17-20, without departing from the scope or spirit of the present invention.

15

The slider can be colored, opaque or clear. The slider may be injection molded or made by any other method. The slider may be molded from any suitable plastic material, such as, nylon, polypropylene,
20 polystyrene, acetal, toughened acetal, polyketone, polybutylene terephthalate, high density polyethylene, polycarbonate or ABS (acrylonitrile-butadiene-styrene).

The interlocking fastening strips may be manufactured
25 by extrusion through a die. In addition, the fastening strips may be manufactured to have approximately uniform cross-sections. This not only simplifies the manufacturing of a closure device, but also contributes to the physical flexibility of the closure device, which may
30 be a desirable property.

Generally, the interlocking fastening strips may be formed from any suitable thermoplastic material including, for example, polyethylene, polypropylene, nylon, or the

like, or from a combination thereof. Thus, resins or mixtures of resins such as high density polyethylene, medium density polyethylene, and low density polyethylene may be employed to form the fastening strips. In most
5 instances, the fastening strips are preferably made from low density polyethylene. The selection of the appropriate thermoplastic material, however, is related to the particular design of the fastening strips, the Young's Modulus of the thermoplastic material, and the desired
10 elasticity and flexibility of the strips.

When the interlocking fastening strips are used in a sealable bag, the fastening strips and the films that form the side walls of the bag may be conveniently manufactured
15 from heat sealable material. In this way, the bag may be economically formed by using an aforementioned thermoplastic material and by heat sealing the fastening strips to the bag. In most instances, the bag is preferably made from a mixture of high pressure, low
20 density polyethylene and linear, low density polyethylene.

The interlocking fastening strips may be manufactured by extrusion or other known methods. For example, the closure device may be manufactured as individual fastening
25 strips for later attachment to the side walls of the bag or may be manufactured integrally therewith. In addition, the fastening strips may be manufactured with or without flange portions on one or both of the fastening strips depending upon the intended use of the closure device or
30 expected additional manufacturing operations.

Generally, the closure device can be manufactured in a variety of forms to suit the intended use. The closure device may be integrally formed on the opposing side walls

of the container or bag, or connected to the container by way of any known method. For example, a thermoelectric device may be applied to a film in contact with the flange portion of the fastening strips or the thermoelectric
5 device may be applied to a film in contact with the base portion of fastening strips having no flange portion, to cause a transfer of heat through the film to produce melting at the interface of the film and a flange portion or base portion of the fastening strips. Suitable
10 thermoelectric devices include heated rotary discs, traveling heater bands, resistance-heated slide wires, and the like. The connection between the film and the fastening strips may also be established by the use of hot melt adhesives, hot jets of air to the interface,
15 ultrasonic heating, or other known methods. The bonding of the fastening strips to the film stock may be carried out either before or after the film is U-folded to form the bag. In any event, such bonding is done prior to side sealing the bag at the edges by conventional thermal
20 cutting. In addition, the first and second fastening strips may be positioned on opposite sides of the film. Such an embodiment would be suited for wrapping an object or a collection of objects such as wires. The first and second fastening strips should usually be positioned on
25 the film in a generally parallel relationship with respect to each other, although this will depend on the intended use.

In summary, the present invention provides a multi-
30 piece slider member for use with a closure device having interlocking fastening strips disposed along opposing side walls of a storage container, such as a conventional plastic bag. The slider member comprises a first housing segment, a separate second housing segment, and a

latching mechanism for use in assembling the first and second housing segments together onto the fastening strips. The latching mechanism includes a first member disposed on the first housing segment and a cooperating
5 second member disposed on the second housing segment. The first and second members of the latching mechanism each have a shoulder with an edge portion. When the first and second housing segments are moved together during assembly, the second member of the latching
10 mechanism receives the first member of the latching mechanism. The edge portion of the first member engages the edge portion of the second member to hold the first and second housing segments together in an assembled position.

15

While the present invention has been described and disclosed in connection with certain illustrated embodiments, it will be understood, of course, that there is no intention to limit the invention to the disclosed
20 structural forms. On the contrary, the intention is to cover to cover all modifications, alternative constructions, and equivalents that fall within the scope and spirit of the present invention as defined by the following claims. In addition, all references and co-
25 pending applications cited herein are hereby incorporated by reference in their entireties.

WHAT IS CLAIMED IS:

1. A closure device comprising:
interlocking fastening strips; and
5 a slider member slidably disposed on the
interlocking fastening strips, the slider member
facilitating the occlusion of said fastening strips when
moved towards a first end thereof and facilitating the
deocclusion of said fastening strips when moved towards a
10 second end thereof, the slider member including a first
housing segment, a separate second housing segment, and a
latching mechanism comprising a first member disposed on
the first housing segment and a cooperating second member
disposed on the second housing segment, the first and
15 second members each having a shoulder with an edge
portion, the second member of the latching mechanism
receiving the first member of the latching mechanism when
the first and second housing segments are moved together
while the edge portion of the first member engages the
20 edge portion of the second member to hold the first and
second housing segments together in an assembled position
upon the interlocking fastening strips.
2. The invention set forth in claim 1, wherein the
25 first and second housing segments each have a top
portion, a side portion, and a bottom portion, the top
portions of the first and second housing segments each
having an opposing face.
3. The invention set forth in claim 2, wherein the
30 face of the first housing segment abuts the face of the
second housing segment when the first and second housing

segments are in the assembled position.

4. The invention set forth in claim 1, wherein the first and second members of the latching mechanism are
5 resilient.

5. The invention set forth in claim 2, wherein the first member of the latching mechanism has a partially planar configuration and projects outwardly from the top
10 portion of the first housing segment.

6. The invention set forth in claim 1, further comprising:

a first alignment pin projecting outwardly from the
15 top portion of the first housing segment; and

a first cooperating slot formed in the top portion of the second housing segment.

7. The invention set forth in claim 6, wherein
20 said first cooperating slot receives said first alignment pin when the first and second housing segments are moved toward the assembled position.

8. The invention set forth in claim 6 further
25 comprising a second alignment pin and a second cooperating slot.

9. The invention set forth in claim 5, wherein the second member of the latching mechanism has a partially planar configuration and projects outwardly from the top
30 portion of the second housing segment.

10. The invention set forth in claim 5, wherein the first member of the latching mechanism is disposed adjacent to a first aperture formed in the top portion of the first housing segment and the second member of the
5 latching mechanism is disposed adjacent to a second aperture formed in the top portion of the second housing segment.

11. The invention set forth in claim 10, wherein
10 said first and second apertures formed in the top portions of the first and second housing segments each project inwardly from the faces thereof.

12. The invention set forth in claim 10, wherein
15 said top portion of the first housing segment includes a third aperture, said first aperture is disposed on one side of the first member, said third aperture is disposed on the opposite side of the first member, said top portion of the second housing segment includes a fourth
20 aperture, said second aperture is disposed on one side of the second member, said fourth aperture is disposed on the opposite side of the second member.

13. The invention set forth in claim 11, wherein
25 said first and second apertures formed in the top portions of the first and second housing segments each have a chamfer at the faces thereof.

14. The invention set forth in claim 13, wherein
30 the shoulder of the first member is disposed at a distal end of the first member and the shoulder of the second member is disposed at a distal end of the second member.

15. The invention set forth in claim 14, wherein the shoulders of the first and second members each have an inclined camming surface.

5

16. The invention set forth in claim 15, wherein the inclined camming surface of the first member is adapted to engage the inclined camming surface of the second member when the first and second housing segments are moved toward the assembled position.

10

17. The invention set forth in claim 13, wherein the shoulder of the first member is received by said second aperture formed in the top portion of the second housing segment and is proximate to the chamfer thereof when the first and second housing segments are in the assembled position.

15

18. The invention set forth in claim 13, wherein the shoulder of the second member is received by said first aperture formed in the top portion of the first housing segment and is proximate to the chamfer thereof when the first and second housing segments are in the assembled position.

25

19. The invention set forth in claim 1, wherein the first member of the latching mechanism is offset from but substantially parallel to the second member of the latching mechanism when the first and second housing segments are in the assembled position.

30

20. The invention set forth in claim 1, wherein the

first and second members of the latching mechanism are adapted to flex when the first and second housing segments are moved toward the assembled position.

5 21. The invention set forth in claim 5, wherein a first one aperture is formed in the top portion of the second housing segment.

10 22. The invention set forth in claim 21, wherein the shoulder of the second member is disposed adjacent to said first aperture formed in the top portion of the second housing segment.

15 23. The invention set forth in claim 22, wherein the shoulder of the first member is disposed at a distal end of the first member.

20 24. The invention set forth in claim 23, wherein the shoulder of the first member includes an inclined camming surface.

25 25. The invention set forth in claim 24, wherein the inclined camming surface of the first member engages the shoulder of the second member when the first and second housing segments are moved toward the assembled position.

30 26. The invention set forth in claim 25, wherein the first member flexes away from the shoulder of the second housing segment and into said first aperture formed in the top portion of the second housing segment when the first and second housing segments are moved

toward the assembled position.

27. The invention set forth in claim 1, wherein the
interlocking fastening strips comprise U-channel type
5 fastening strips.

28. The invention set forth in claim 1, wherein the
interlocking fastening strips comprise shear action
fastening strips.

10

29. The invention set forth in claim 1, wherein the
interlocking fastening strips comprise arrowhead-type
fastening strips.

15 30. The invention set forth in claim 1, wherein the
interlocking fastening strips comprise rolling action
fastening strips.

31. The invention set forth in claim 1, wherein the
20 interlocking fastening strips comprise profile fastening
strips.

32. A storage container comprising:
first and second side walls including a first
25 fastening strip and a second fastening strip
respectively, said first and second fastening strips
arranged to be interlocked over a predetermined length;
and

a slider member slidably disposed on the first and
30 second fastening strips for facilitating the occlusion of
said fastening strips when moved towards a first end
thereof and for facilitating the deocclusion of said

fastening strips when moved towards a second end thereof,
the slider member including a first housing segment, a
separate second housing segment, and a latching mechanism
comprising a first member disposed on the first housing
5 segment and a cooperating second member disposed on the
second housing segment, the first and second members each
having a shoulder with an edge portion, the second member
of the latching mechanism receiving the first member of
the latching mechanism when the first and second housing
10 segments are moved together while the edge portion of the
first member engages the edge portion of the second
member to hold the first and second housing segments
together in an assembled position upon the fastening
strips.

15

33. The invention set forth in claim 32, wherein
the first and second housing segments each have a top
portion, a side portion, and a bottom portion, the top
portions of the first and second housing segments each
20 having an opposing face.

34. The invention set forth in claim 33, wherein
the face of the first housing segment abuts the face of
the second housing segment when the first and second
25 housing segments are in the assembled position.

35. The invention set forth in claim 32, wherein
the first and second members of the latching mechanism
are resilient.

30

36. The invention set forth in claim 33, wherein
the first member of the latching mechanism has a

partially planar configuration and projects outwardly from the top portion of the first housing segment.

37. The invention set forth in claim 32, further comprising:

a first alignment pin projecting outwardly from the top portion of the first housing segment; and

a first cooperating slot formed in the top portion of the second housing segment.

10

38. The invention set forth in claim 37, wherein said first cooperating slot receives said first alignment pin when the first and second housing segments are moved toward the assembled position.

15

39. The invention set forth in claim 37 further comprising a second alignment pin and a second cooperating slot.

40. The invention set forth in claim 36, wherein the second member of the latching mechanism has a partially planar configuration and projects outwardly from the top portion of the second housing segment.

41. The invention set forth in claim 36, wherein the first member of the latching mechanism is disposed adjacent to a first aperture formed in the top portion of the first housing segment and the second member of the latching mechanism is disposed adjacent to a second aperture formed in the top portion of the second housing segment.

30

42. The invention set forth in claim 41, wherein said first and second apertures formed in the top portions of the first and second housing segments each project inwardly from the faces thereof.

5

43. The invention set forth in claim 41, wherein said top portion of the first housing segment includes a third aperture, said first aperture is disposed on one side of the first member, said third aperture is disposed on the opposite side of the first member, said top portion of the second housing segment includes a fourth aperture, said second aperture is disposed on one side of the second member, said fourth aperture is disposed on the opposite side of the second member.

10
15

44. The invention set forth in claim 42, wherein said first and second apertures formed in the top portions of the first and second housing segments each have a chamfer at the faces thereof.

20

45. The invention set forth in claim 44, wherein the shoulder of the first member is disposed at a distal end of the first member and the shoulder of the second member is disposed at a distal end of the second member.

25

46. The invention set forth in claim 45, wherein the shoulders of the first and second members each have an inclined camming surface.

30

47. The invention set forth in claim 46, wherein the inclined camming surface of the first member is adapted to engage the inclined camming surface of the

second member when the first and second housing segments are moved toward the assembled position.

48. The invention set forth in claim 44, wherein
5 the shoulder of the first member is received by said second aperture formed in the top portion of the second housing segment and is proximate to the chamfer thereof when the first and second housing segments are in the assembled position.

10

49. The invention set forth in claim 44, wherein
the shoulder of the second member is received by said first aperture formed in the top portion of the first housing segment and is proximate to the chamfer thereof
15 when the first and second housing segments are in the assembled position.

50. The invention set forth in claim 32, wherein
the first member of the latching mechanism is offset from
20 but substantially parallel to the second member of the latching mechanism when the first and second housing segments are in the assembled position.

51. The invention set forth in claim 32, wherein
25 the first and second members of the latching mechanism are adapted to flex when the first and second housing segments are moved toward the assembled position.

52. The invention set forth in claim 36, wherein a
30 first one aperture is formed in the top portion of the second housing segment.

53. The invention set forth in claim 52, wherein the shoulder of the second member is disposed adjacent to said first aperture formed in the top portion of the second housing segment.

5

54. The invention set forth in claim 53, wherein the shoulder of the first member is disposed at a distal end of the first member.

10

55. The invention set forth in claim 54, wherein the shoulder of the first member includes an inclined camming surface.

15

56. The invention set forth in claim 55, wherein the inclined camming surface of the first member engages the shoulder of the second member when the first and second housing segments are moved toward the assembled position.

20

57. The invention set forth in claim 56, wherein the first member flexes away from the shoulder of the second housing segment and into said first aperture formed in the top portion of the second housing segment when the first and second housing segments are moved toward the assembled position.

25

58. The invention set forth in claim 32, wherein the interlocking fastening strips comprise U-channel type fastening strips.

30

59. The invention set forth in claim 32, wherein the interlocking fastening strips comprise shear action

fastening strips.

60. The invention set forth in claim 32, wherein
the interlocking fastening strips comprise arrowhead-type
5 fastening strips.

61. The invention set forth in claim 32, wherein
the interlocking fastening strips comprise rolling action
fastening strips.

10

62. The invention set forth in claim 32, wherein
the interlocking fastening strips comprise profile
fastening strips.

15 63. A slider member adapted to facilitate the
occlusion and deocclusion of interlocking fastening
strips, the slider member comprising:

a first housing segment;

a separate second housing segment; and

20 a latching mechanism comprising a first member
disposed on the first housing segment and a cooperating
second member disposed on the second housing segment, the
first and second members each having a shoulder with an
edge portion, the second member of the latching mechanism
25 receiving the first member of the latching mechanism when
the first and second housing segments are moved together
while the edge portion of the first member engages the
edge portion of the second member to hold the first and
second housing segments together in an assembled
30 position.

64. The invention set forth in claim 63, wherein

the first and second housing segments each have a top portion, a side portion, and a bottom portion, the top portions of the first and second housing segments each having an opposing face.

5

65. The invention set forth in claim 64, wherein the face of the first housing segment abuts the face of the second housing segment when the first and second housing segments are in the assembled position.

10

66. The invention set forth in claim 63, wherein the first and second members of the latching mechanism are resilient.

15

67. The invention set forth in claim 64, wherein the first member of the latching mechanism has a partially planar configuration and projects outwardly from the top portion of the first housing segment.

20

68. The invention set forth in claim 63, further comprising:

a first alignment pin projecting outwardly from the top portion of the first housing segment; and

a first cooperating slot formed in the top portion
25 of the second housing segment.

69. The invention set forth in ~~claim~~ 68, wherein said first cooperating slot receives said first alignment pin when the first and second housing segments are moved
30 toward the assembled position.

70. The invention set forth in claim 68 further

comprising a second alignment pin and a second cooperating slot.

71. The invention set forth in claim 67, wherein
5 the second member of the latching mechanism has a partially planar configuration and projects outwardly from the top portion of the second housing segment.

72. The invention set forth in claim 67, wherein
10 the first member of the latching mechanism is disposed adjacent to a first aperture formed in the top portion of the first housing segment and the second member of the latching mechanism is disposed adjacent to a second
15 aperture formed in the top portion of the second housing segment.

73. The invention set forth in claim 72, wherein
said first and second apertures formed in the top
portions of the first and second housing segments each
20 project inwardly from the faces thereof.

74. The invention set forth in claim 72, wherein
said top portion of the first housing segment includes a third aperture, said first aperture is disposed on one
25 side of the first member, said third aperture is disposed on the opposite side of the first member, said top portion of the second housing segment includes a fourth aperture, said second aperture is disposed on one side of the second member, said fourth aperture is disposed on
30 the opposite side of the second member.

75. The invention set forth in claim 73, wherein

said first and second apertures formed in the top portions of the first and second housing segments each have a chamfer at the faces thereof.

5 76. The invention set forth in claim 75, wherein the shoulder of the first member is disposed at a distal end of the first member and the shoulder of the second member is disposed at a distal end of the second member.

10 77. The invention set forth in claim 76, wherein the shoulders of the first and second members each have an inclined camming surface.

15 78. The invention set forth in claim 77, wherein the inclined camming surface of the first member is adapted to engage the inclined camming surface of the second member when the first and second housing segments are moved toward the assembled position.

20 79. The invention set forth in claim 75, wherein the shoulder of the first member is received by said second aperture formed in the top portion of the second housing segment and is proximate to the chamfer thereof when the first and second housing segments are in the
25 assembled position.

80. The invention set forth in claim 75, wherein the shoulder of the second member is received by said first aperture formed in the top portion of the first
30 housing segment and is proximate to the chamfer thereof when the first and second housing segments are in the assembled position.

81. The invention set forth in claim 63, wherein the first member of the latching mechanism is offset from but substantially parallel to the second member of the latching mechanism when the first and second housing segments are in the assembled position.

82. The invention set forth in claim 63, wherein the first and second members of the latching mechanism are adapted to flex when the first and second housing segments are moved toward the assembled position.

83. The invention set forth in claim 67, wherein a first one aperture is formed in the top portion of the second housing segment.

84. The invention set forth in claim 83, wherein the shoulder of the second member is disposed adjacent to said first aperture formed in the top portion of the second housing segment.

85. The invention set forth in claim 84, wherein the shoulder of the first member is disposed at a distal end of the first member.

86. The invention set forth in claim 85, wherein the shoulder of the first member includes an inclined camming surface.

87. The invention set forth in claim 86, wherein the inclined camming surface of the first member engages the shoulder of the second member when the first and

second housing segments are moved toward the assembled position.

88. The invention set forth in claim 87, wherein
5 the first member flexes away from the shoulder of the second housing segment and into said first aperture formed in the top portion of the second housing segment when the first and second housing segments are moved toward the assembled position.

10

89. A method for manufacturing a closure device comprising the steps of:

providing interlocking fastening strips;

providing a slider member including a first housing
15 segment, a separate second housing segment, and a latching mechanism comprising a first member disposed on the first housing segment and a cooperating second member disposed on the second housing segment, the first and second members each having a shoulder with an edge
20 portion;

positioning the first housing segment and the second housing segment in proximity to the fastening strips; and

moving the first housing segment and the second housing segment together, the second member of the
25 latching mechanism receiving the first member of the latching mechanism when the first and second housing segments are moved together while the edge portion of the first member engages the edge portion of the second member to hold the first and second housing segments
30 together in an assembled position upon the interlocking fastening strips, the assembled slider member slidably disposed on the interlocking fastening strips, the

assembled slider member facilitating the occlusion of said fastening strips when moved towards a first end thereof and facilitating the deocclusion of said fastening strips when moved towards a second end thereof.

5

90. The invention set forth in claim 89, wherein the first and second housing segments each have a top portion, a side portion, and a bottom portion, the top portions of the first and second housing segments each having an opposing face, the face of the first housing segment abuts the face of the second housing segment when the first and second housing segments are in the assembled position.

15 91. The invention set forth in claim 90, wherein the first member of the latching mechanism has a partially planar configuration and projects outwardly from the top portion of the first housing segment.

20 92. The invention set forth in claim 89, further comprising:

a first alignment pin projecting outwardly from the top portion of the first housing segment; and

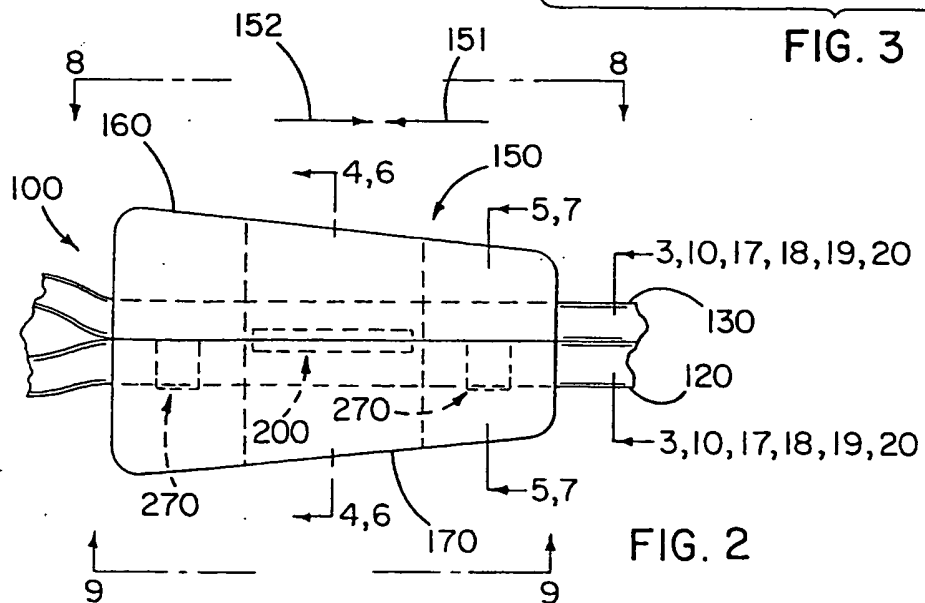
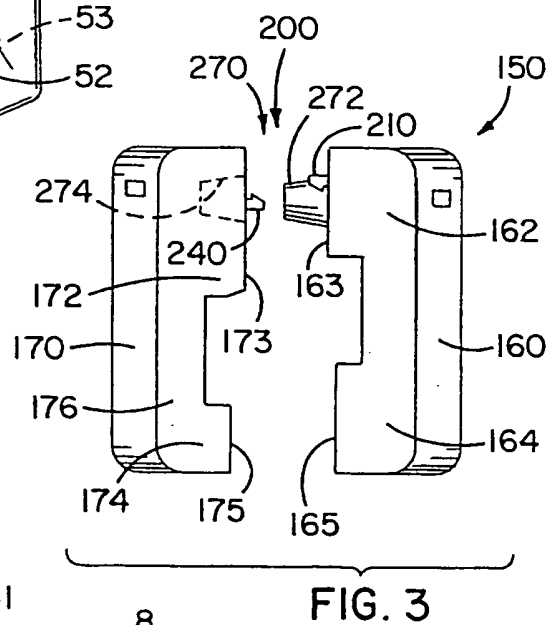
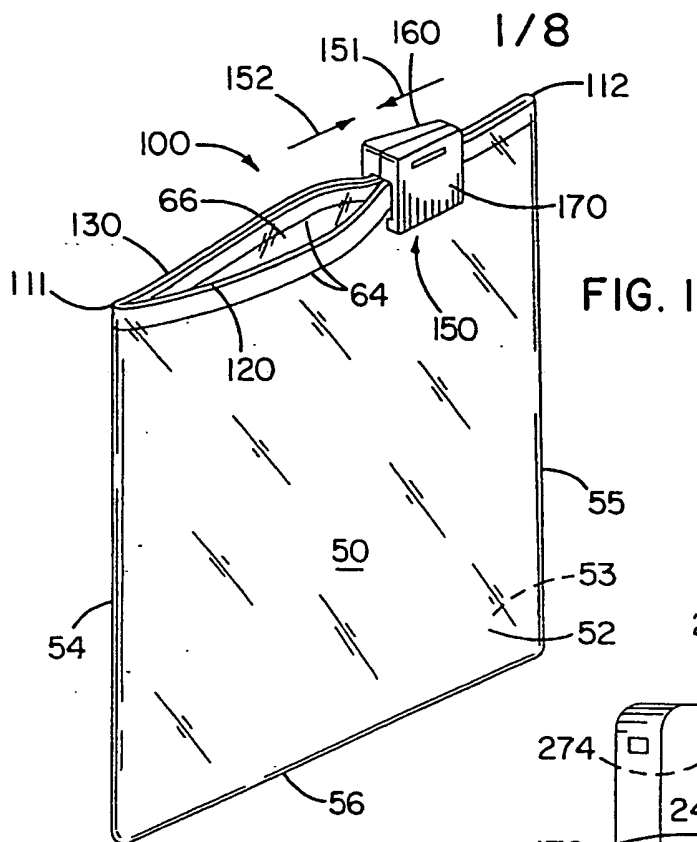
25 a first cooperating slot formed in the top portion of the second housing segment.

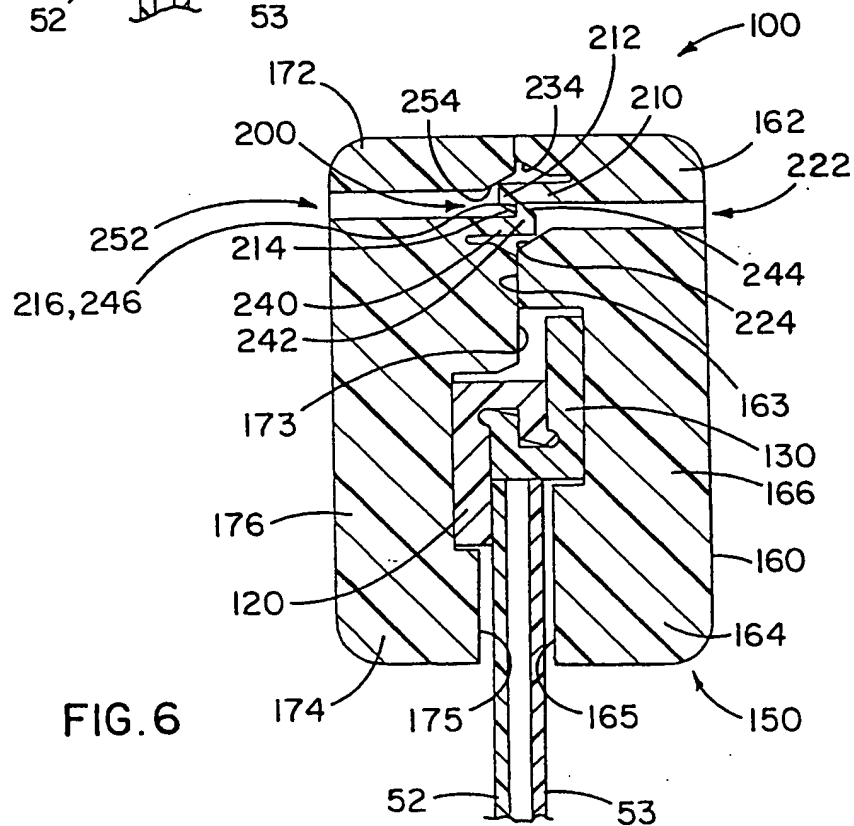
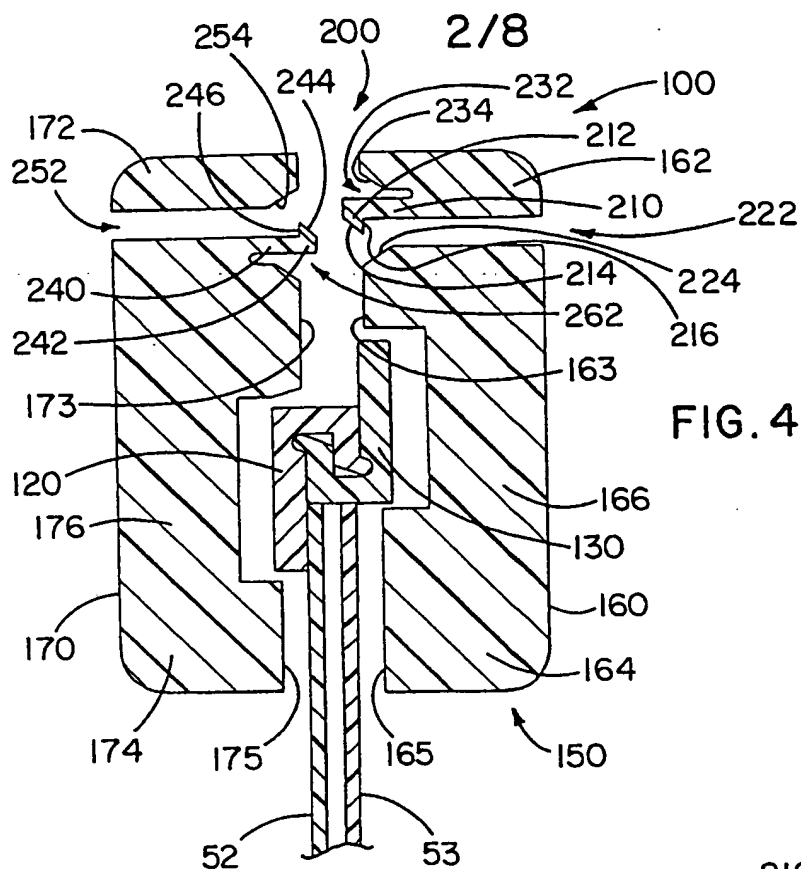
93. The invention set forth in claim 92, wherein said first cooperating slot receives said first alignment pin when the first and second housing segments are moved toward the assembled position.

30

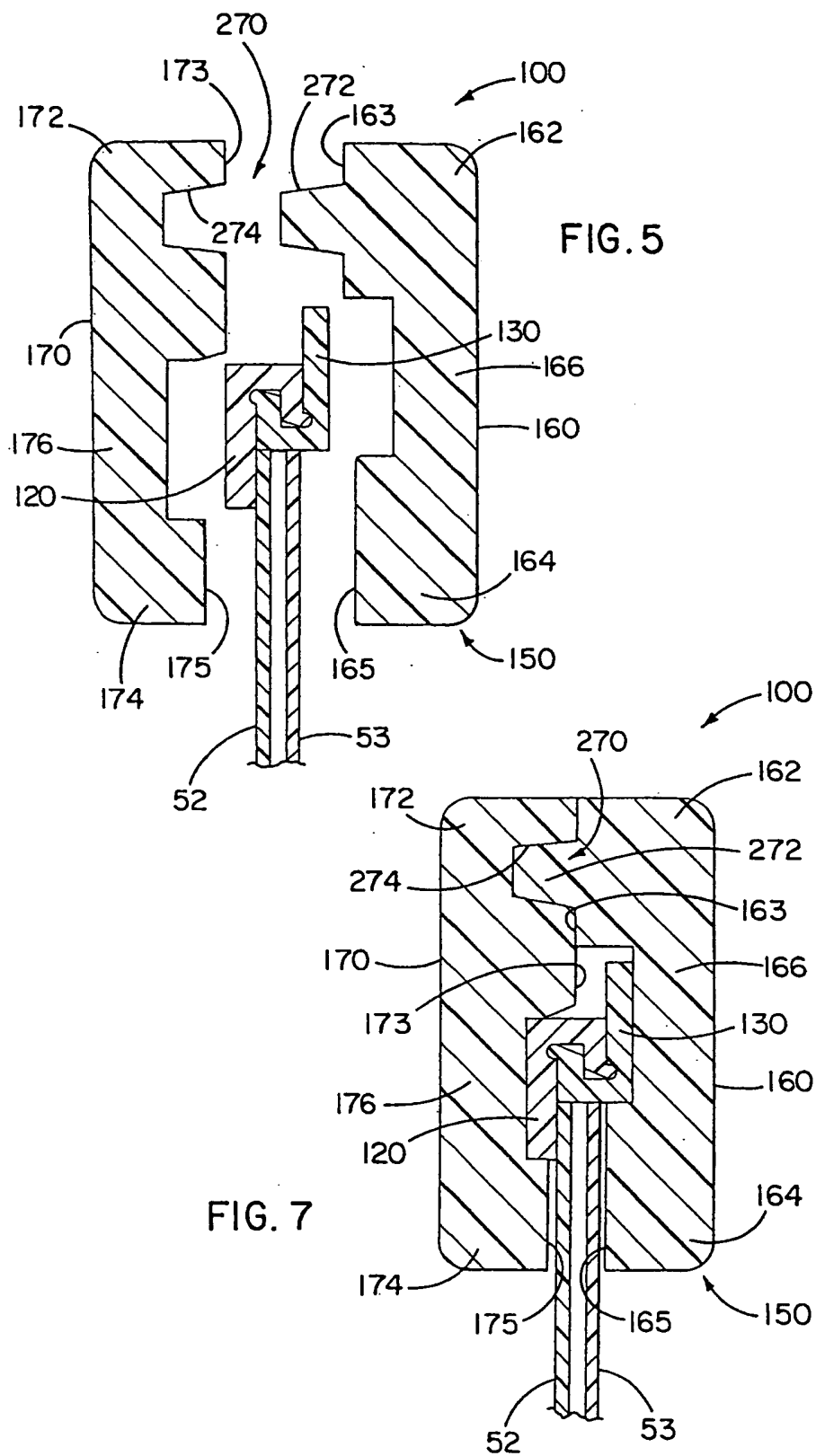
94. The invention set forth in claim 92 further

comprising a second alignment pin and a second cooperating slot.

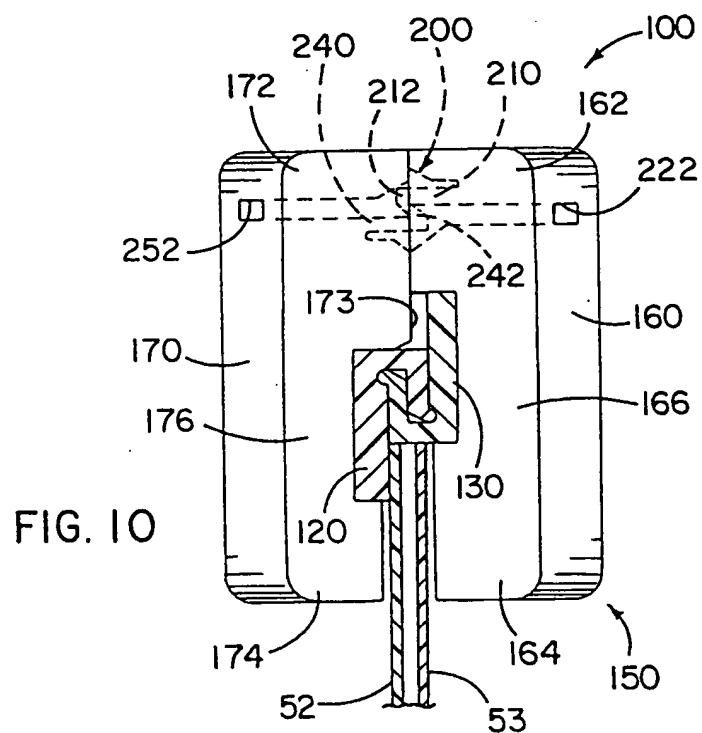
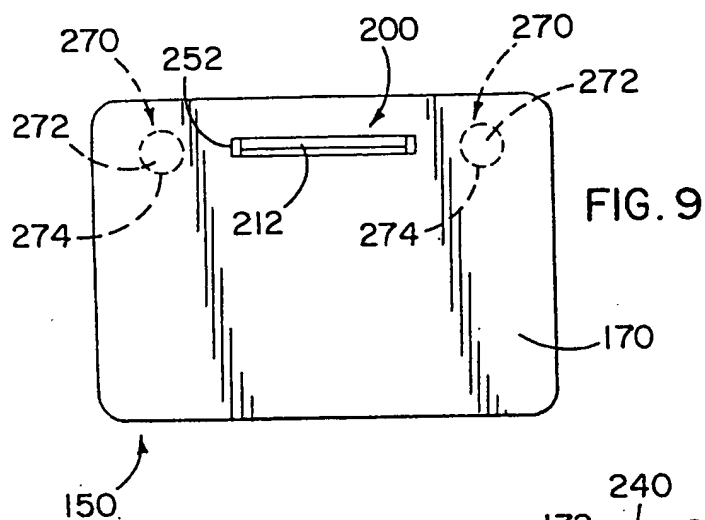
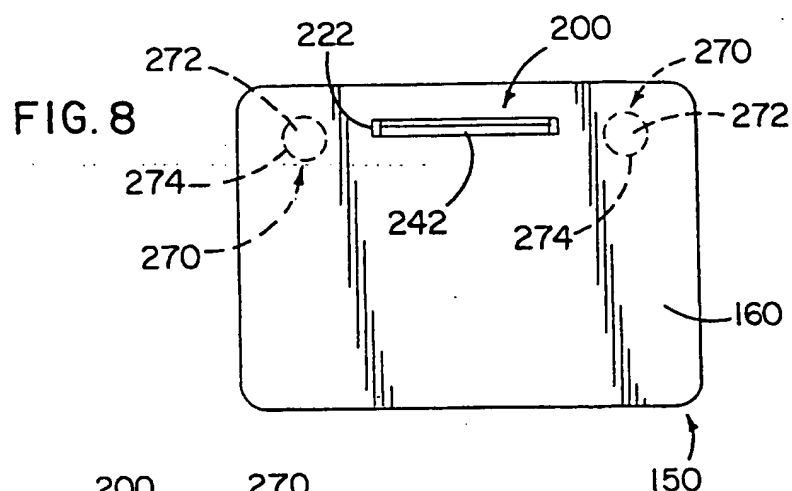




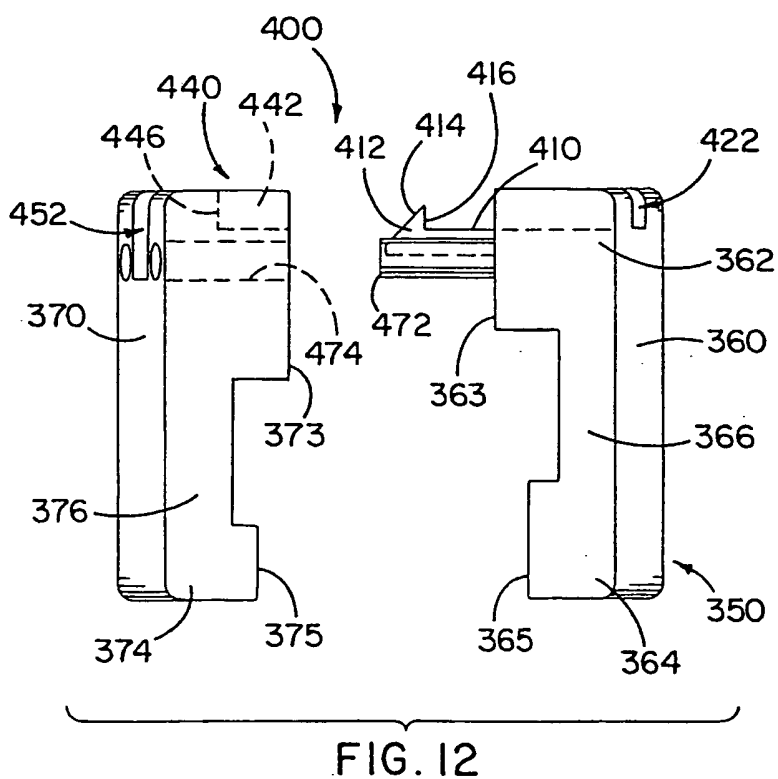
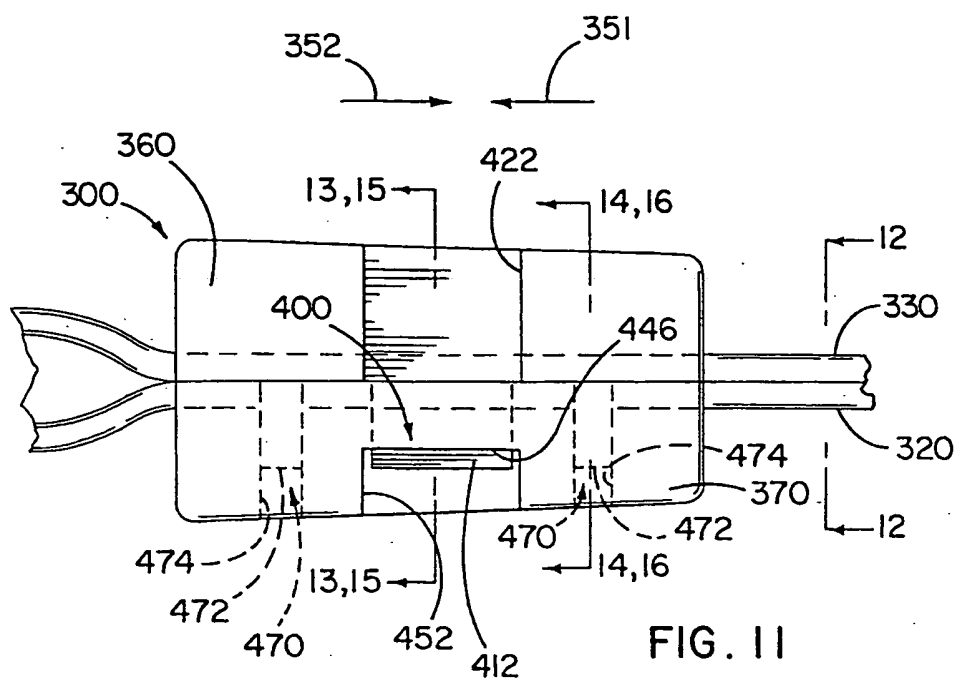
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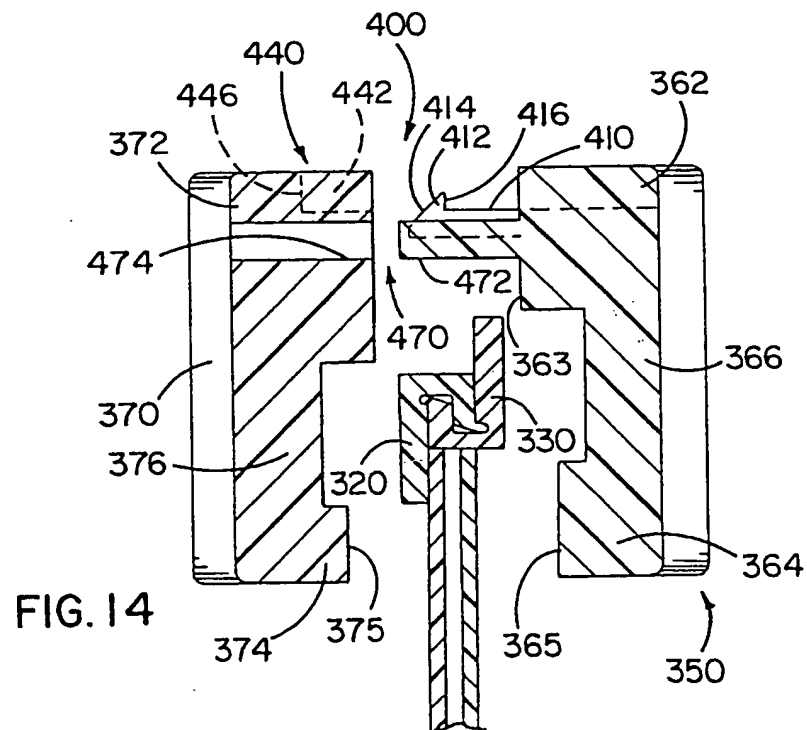
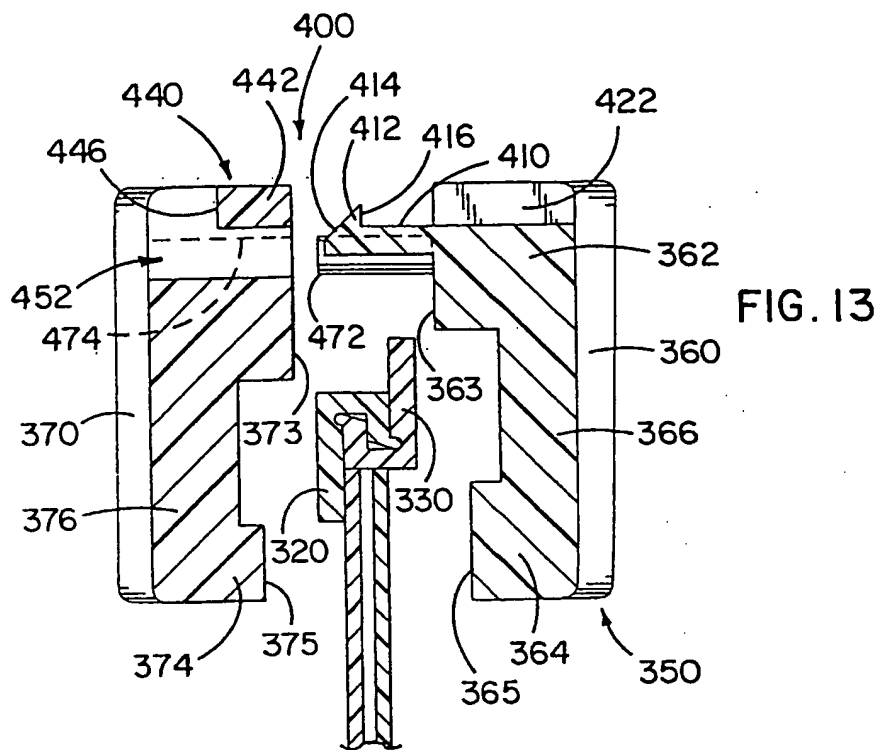
4/8



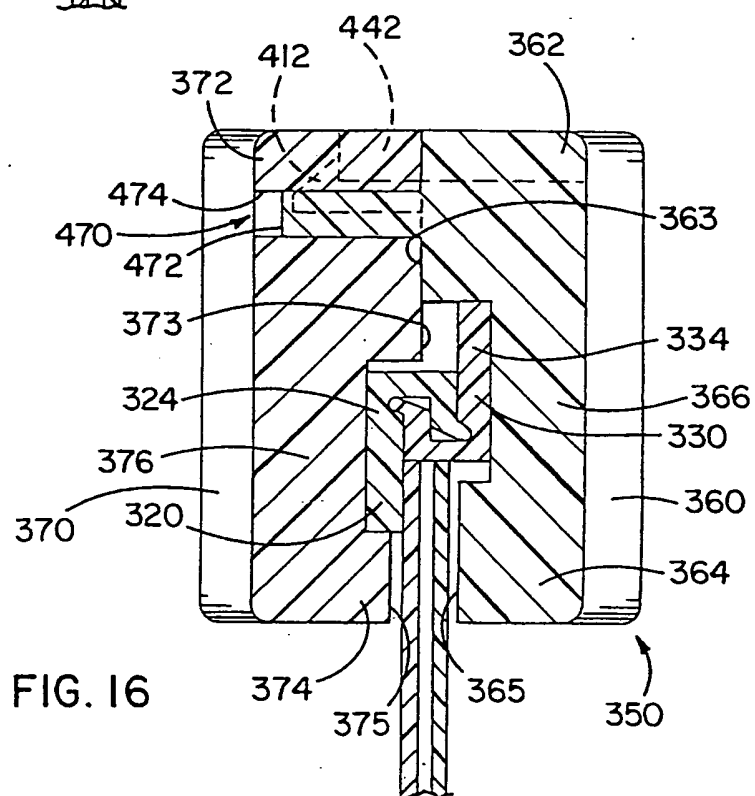
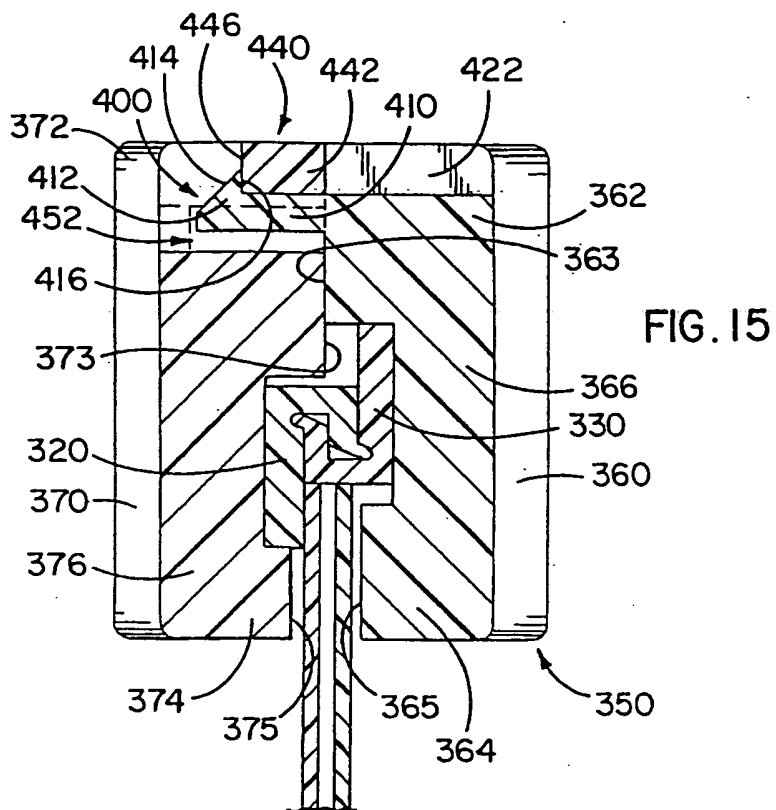
5/8



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7/8



8/8

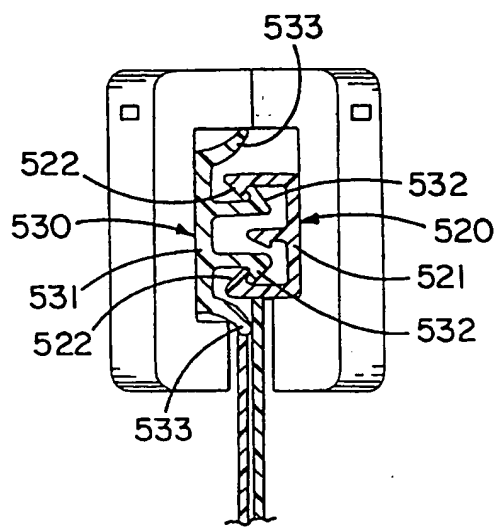


FIG. 17

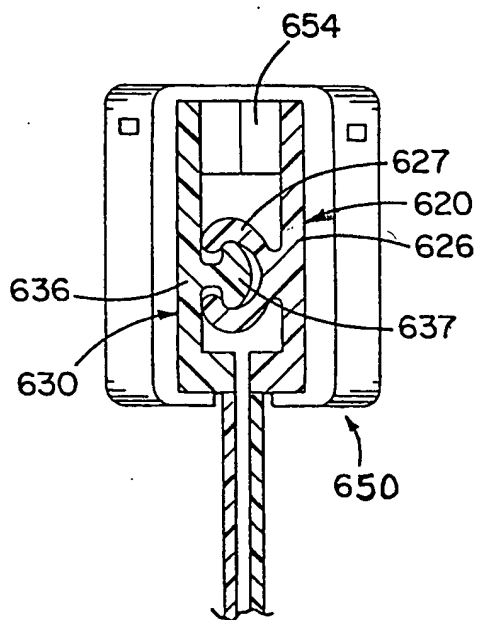


FIG. 18

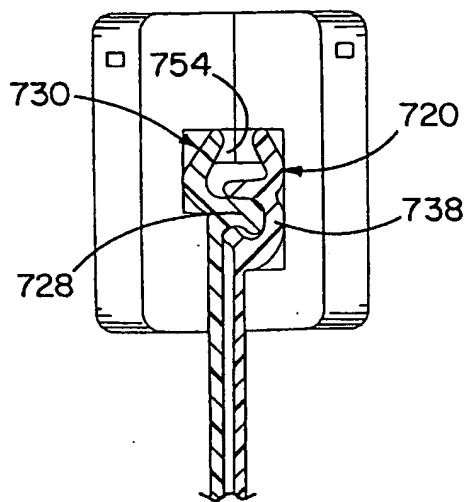


FIG. 19

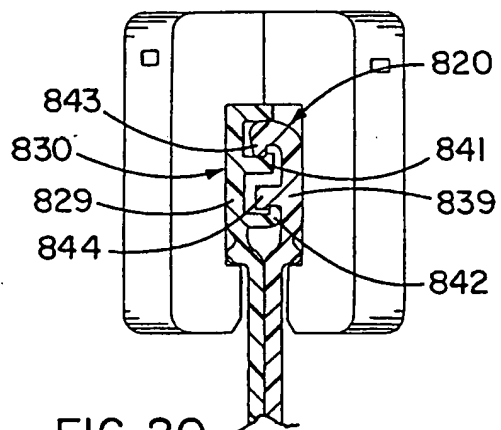


FIG. 20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/13092

| A. CLASSIFICATION OF SUBJECT MATTER | | | | | | | | | | | | |
|--|--|--|--|---|--|--|---|--|--|---|--|--|
| IPC(6) :A44B 19/00 ; A41H 37/00 US CL :24/587, 400, 399, 30.5R ; 383/63, 65 ; 156/66 According to International Patent Classification (IPC) or to both national classification and IPC | | | | | | | | | | | | |
| B. FIELDS SEARCHED | | | | | | | | | | | | |
| Minimum documentation searched (classification system followed by classification symbols) U.S. : 24/587, 400, 399, 30.5R, 30.5P, 576, 389 ; 383/63, 65 ; 156/66 | | | | | | | | | | | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched | | | | | | | | | | | | |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) | | | | | | | | | | | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | | | | | | | | | | | |
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | | | | | | | | | | |
| Y | US 3,074,137 A (HAWLEY) 22 JANUARY 1963 (22/01/63) . SEE THE ENTIRE DOCUMENT . | 1 - 94 | | | | | | | | | | |
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| Y | US 3,579,747 A (HAWLEY) 25 MAY 1971 (25/05/71) . SEE THE ENTIRE DOCUMENT . | 1 - 94 | | | | | | | | | | |
| Y, E | US 5,924,173 A (DOBRESKI ET AL) 20 JULY 1999 (20/07/99) . SEE THE ENTIRE DOCUMENT . | 1 - 94 | | | | | | | | | | |
| Y | US 3,106,941 A (PLUMMER) 15 OCTOBER 1963 (15/10/63) . SEE THE ENTIRE DOCUMENT . | 1 - 94 | | | | | | | | | | |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex. | | | | | | | | | | | | |
| * Special categories of cited documents: <table border="0"> <tr> <td>*A* document defining the general state of the art which is not considered to be of particular relevance</td> <td>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>*E* earlier document published on or after the international filing date</td> <td>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>*O* document referring to an oral disclosure, use, exhibition or other means</td> <td>*Z* document member of the same patent family</td> </tr> <tr> <td>*P* document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table> | | | *A* document defining the general state of the art which is not considered to be of particular relevance | *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention | *E* earlier document published on or after the international filing date | *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone | *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art | *O* document referring to an oral disclosure, use, exhibition or other means | *Z* document member of the same patent family | *P* document published prior to the international filing date but later than the priority date claimed | |
| *A* document defining the general state of the art which is not considered to be of particular relevance | *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention | | | | | | | | | | | |
| *E* earlier document published on or after the international filing date | *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone | | | | | | | | | | | |
| *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art | | | | | | | | | | | |
| *O* document referring to an oral disclosure, use, exhibition or other means | *Z* document member of the same patent family | | | | | | | | | | | |
| *P* document published prior to the international filing date but later than the priority date claimed | | | | | | | | | | | | |
| Date of the actual completion of the international search 01 SEPTEMBER 1999 | | Date of mailing of the international search report 14 OCT 1999 | | | | | | | | | | |
| Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230 | | Authorized officer <i>Victor Sakran</i> VICTOR SAKRAN Telephone No. (703) 308-2224 | | | | | | | | | | |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/13092

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| Y | US 5,722,128 A (TONEY ET AL) 03 MARCH 1998 (03/03/98) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
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| Y | US 5,010,627 A (HERRINGTON ET AL) 30 APRIL 1991 (30/04/91) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
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| Y | US 3,806,998 A (LAGUERRE) 30 APRIL 1974 (30/04/74) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
| Y | US 3,713,923 A (LAGUERRE) 30 JANUARY 1973 (30/01/73) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
| Y | US 3,426,396 A (LAGUERRE) 11 FEBRUARY 1969 (11/02/69) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |

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International application No.
PCT/US99/13092

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
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| Y | US 2,960,561 A (PLUMMER) 15 NOVEMBER 1960 (15/11/60) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
| Y | US 5,442,837 A (MORGAN) 22 AUGUST 1995 (22/08/95) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
| Y | FR 1,564,039 A (LAGUERRE) 18 APRIL 1969 (18/04/69) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
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| Y | US 5,426,830 A (RICHARDSON ET AL) 27 JUNE 1995 (27/06/95) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
| Y | US 5,431,760 A (DONOVAN) 11 JULY 1995 (11/07/95) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |
| Y | US 5,301,394 A (RICHARDSON ET AL) 12 APRIL 1994 (12/04/94) . SEE THE ENTIRE DOCUMENT . | 1 - 94 |